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ABSTRACT

The College Education Achievement Project (CEAP) is designed to raise the level of scholastic performance of high school graduates who are underprepared for the standard type college programs. The Project provides a program of learning experiences for developing the learning skills essential for college work. It is a transitional year program during which the students can earn some college credits. The purpose of this study was to determine which variables were crucial to predicting the success of CEAP enrollees at Albany State College, Albany, Georgia, and to develop criteria for the selection of those students who could profit most from the program in terms of their success in college. In the fall of 1969 students enrolled in the program were administered a battery of tests. Another form of these tests which included the STEP, CPI, and SAT, was administered in the spring of 1970. Discriminant Analysis and Chi-square Contingency Analyses were employed in the investigation. There were 13 predictor variables and 5 criterion variables, and two prediction equations were obtained for each of the 5 criterion scores. The results indicated that the five best predictors were: SAT Verbal pretests, CPI pretests, STEP-Reading, Mathematics, and Listening gain scores and SAT Verbal gain scores. (AF)

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A PRELIMINARY REPORT ON PREDICTING THE SUCCESS OF COLLEGE EDUCATION ACHIEVEMENT PROJECT ENROLLEES AT ALBANY STATE COLLEGE[1]

BY

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A PRELIMINARY REPORT ON PREDICTING THE SUCCESS OF COLLEGE EDUCATION ACHIEVEMENT PROJECT ENROLLEES AT ALBANY STATE COLLEGE

INTRODUCTION

The College Education Education Achievement Project is an innovative program that provides assistance, support and encouragement to selected developing institutions of higher education in the Southern region in their movement toward a continuous type of program. The continuous type program presupposes a student body with a wide range of pre-college preparation in contrast to the considerably narrower range of preparation required by the traditionally standard program.

The continuous progress type of program enables the developing institutions to serve high-risk students who could demonstrate the capacity of profit from such a program; it also enables these institutions to make a contribution to the national welfare of expanding the pool of educated manpower. While the traditionally standard program in the developing institutions may have the desire efficacy for those students whose pre-college preparation is adequate, a large number of bright, but academically deficient applicants to these institutions come from inadequate secondary schools. Thus without compensatory programs, they are doomed to failure.

The College Education Achievement Project is designed to raise the level of scholastic performance of this population of high school graduates who are under prepared for the traditionally standard type of collegiate program.

Albany State College utilizes a predicted Freshman Average Rating System which includes the high school average and SAT Scores as an admissions requirement. Those students who fail to make the required average are recommended to seek admissions into the College Education Achievement Project, a compensatory program designed to develop their learning and study skills.

The College Education Achievement Project proposes to provide a program of learning experiences for developing the learning skills essential for college work. The success of such students during a transitional year in which they may earn some college credit prepares them to enter the regular college program with assurance of success. With this purpose in mind, it is important for instructors in CEAP to try to structure a model which will facilitate the identification of college potential in these disadvantaged youth and to encourage institutions to make more efforts in the prescription of learning experiences that will insure academic success for students whose academic ability has been inhibited by an inadequate home and school environment.

The purpose of this study was to determine if there is a variable or collection of variables crucial to predicting the success of the College Education Achievement Project Enrollees at Albany State College. If there is a collection of factors, then a second purpose of the study is to develop a criteria for the selection of those students who can profit most from the program and enter the regular college program with some measure of confidence and success.

This is a preliminary report of a study which will continue throughout this year with plans for replication and expansion during the next two years.

REVIEW OF RELATED STUDIES

During the past several years increasing numbers of social scientists have focused attention on the black student and on the predominately Negro institutions of higher eudcation in the United States. The research findings have clarified two important sets of facts: (1) less than six percent of all students currently enrolled in American Colleges are black, whereas almost twelve (12) percent of the college-age population in the United States is black; and (2) more than two-fifths of the black students attend the predominately Negro institutions, which represent four percent of the current 2,300 American undergraduate institutions.

As the press for post-secondary education becomes more intense among black and other minority groups, and as it becomes increasingly apparent that predominantly white institutions were systematically excluding such groups from their campuses-as a consequence of their admissions policies, a question about the adequacy of traditional measures of probable collegiate success has come to the forefront (Gordon, 1965; Kendrick, 1965; Society for the Psychological Study of Social Issues. 1964) More specifically, serious questions about the predictive validity of such indices as high school scholarship and test scores for students whose talent has not been previously realized has been posed by many researchers (Brown and Russell, 1964; Cameron, 1968; Clark and Plotkin, 1963; Fishman and Pasanella, 1960; Fishman et al, 1964).

Such probing inquiries have motivated other researchers to investigate the differential predictability of various instrumental assessments and high school scholarship on college success for non-white (primarily black students). Studies conducted by Boney (1966); Hills Klock and Lewis (1963); and Roberts (1962); give evidence that the Scholastic Aptitude Test (SAT) of the College

Entrance Examination Board is as valid for predicting grades of students in predominantly black colleges as for predicting the college grades of white students. Further, when SAT scores were used in combination with school rank, similar predictive validities have been found between black and white students (Olsen, 1957; Roberts, 1964). The possible bias of the SAT in predicting college grades of black students at integrated colleges was investigated by Cleary (1968). She concluded that there were no significant difference in prediction for black and white from the two Eastern Colleges selected for the study. Morgan (1968) discussed the utility of the SAT-mathematics score for identifying "calculated risk" students. Monday (1965) found that the American College Testing Program (ACTP) battery was as useful for predicting the grades of socially disadvantaged students as it was for predicting the grades for other students. McKelpin (1965) found that the SAT-V for males correlated higher with first semester average grades for entering freshmen than high school grades did with the same criterion at a predominantly black college in Durham, North Carolina. No substantial differences in the predictive validities of the two preadmissions indices were noted in the case of black female students. Re-examination of Cleary's data (1968), revealed that for blacks in one of the integrated college's SAT-V and SAT-M correlated higher with college grade point average than did high school rank.

Recently some predominantly Negro Colleges have begun to require that all of their applicants for admission submit scores on a nationally administered test such as the College Entrance Examination Board Scholastic Aptitude Test (SAT) or the battery of the American College Testing Program. The frequency distributions of test scores in these institutions are often

markedly skewed positively and have smaller standard deviations than are typically found in white colleges. For example, on the SAT, while the mean verbal score for all public-high school seniors would be in the neighborhood of 390, (1) the mean SAT-V score for entrants to a representative predominantly Negro College in a southern state in the fall of 1966 was 277. The standard deviation for all public-high-school seniors would probably be much greater than 100 but for entrants to this college, the standard deviation of SAT-V was 50.

One might wonder how well scores on a test of such great difficulty for these rather homogeneous students would predict their academic performance. The raw correlation coefficients have been reported for many such sets of data, and they are surprisingly adequate. For black men, the tests predict about as accurately as for other men. White women seem to be more predictable than white men, black men, or black women.

Upon observing these phenomena, Stanley and Porter were led to other questions, such as how well the grades of the students in predominantly Negro Colleges could be predicted by a test like the SAT but of more suitable difficulty level. The approach used by these investigators was to give a test similar to the SAT but of lower difficulty to entrants of three predominantly Negro Colleges.

The results indicated that the average multiple correlation of college grades with SAT scores and high-school averages was .60 for black men and .63 for black women, using data from six previous years. For the subjects used in this study, the mean multiple R based on SAT scores and high-school grades was .59, while the mean multiple R based on SCAT scores and high-school grades was .65, a difference of .06 in favor of SCAT, Level 4. Thus the Stanley-

Porter conjecture that with an easier test the multiple correlations would have been higher has been found to be sound.(2)

The quest for non-intellective correlates to college success for college aspirants in general (Cramer and Stevic, 1968) and the disadvantaged student in particular has been discouraging. Stoup (1970) found in a sample of 970 female and 968 male freshmen taken over a 5-year period at the College of Wooster that the Math and Verbal Scholastic Aptitude Test (SAT) were more highly correlated with freshman grade point average (GPA) than were any of the eighteen scales of the CPI. When the CPI and the SAT are compared, the SAT seems to be more efficient as a predictor. Studies by Donnan (1968), Richards, Holland and Lutz (1967), Spencer and Stallings (1968), Stecker and Voigt (1968), Watson (1967), and others seemed to imply that non-intellective factors may be useful and that predictability may vary systematically with the nature of the student groups for which the R's are computed (Ghiselli, 1960a, 1960b, Munday, 1968) have motivated a great deal of concern about their usefulness for predicting the college success of students whose academic credentials are questionable.

Studies at the senior college and university level have been particularly limited in regard to effectiveness and impact of compensatory programs and practices in ameliorating the academic deficiencies of disadvantaged students. Alexako and Rothney (1967) observed that students undergoing a high school guidance laboratory experience tended to perform better in college than a matched group who did not receive such an experience. Meister et al (1962) reported that the program Operation Second Chance has produced a reversal of the trend academic failures, Froe (1966) reported on the innovative and flexible three tract program developed at Morgan State College. For upgrading the quality of remedial programs, Theresa Love (1966) described

four approaches that were developed to stimulate language development in youths with linguistic handicaps.

When attrition rate has been considered as a criterion of success, it has been noted that in most instances, disadvantaged students' holding rate was not measurably different from that of regular students (Williams, 1969). However, very little systematic research has been conducted to determine whether the comparable retention rate for disadvantaged students is a function of innovations in compensatory programs or other factors, i.e., selection of less competitive courses, lighter course loads, a typical persistence patterns.

PROCEDURE

Early in the Fall Quarter, 1969, students enrolled in the CEAP were administered a battery of tests. Near the end of the Spring Quarter, 1970, another form of the same tests was administered to the students. The tests included the Sequential Tests of Educational Progress (STEP), the California Psychological Inventory (CPI), and the Scholastic Aptitude Test (SAT). During the academic year, the California Mental Maturity Test (CMMT) was also administered.

On the basis of preliminary analysis, thirteen of the Fall test scores were selected a predictors and five of the Spring test scores were selected as criteria. Step-wise regression analysis was employed for predicting gain scores.

RESULTS

Means and standard deviations for predictor and criterion variables are shown in Table I. The first thirteen variables listed were used as predictors. The first three are pretest scores on STEP subjects, and the next seven are CPI subtests. The last five items in Table I represent the gain scores.

TABLE I. Predictor and Criterion Variables

Variable	Mean	Standard Deviation	Number of Subjects
1 - Reading Pretest	272.1845	14.1295	103
2 - Listening Pretest	272.3700	10.4027	100
3 - Mathematics Pretest	250.8416	15.6931	101
4 - Well-Being (CPI)	26.4327	14.6020	103
5 - Responsibility	36.1635	9.5380	103
6 - Socialization	43.2404	10.8247	103
7 - Tolerance	28.3846	9.6132	103
8 - Achievement via Conformity	39.4343	11.4608	99
9 - Achievement via Independence	36.9091	9.7511	99
10 - Intellectual Efficiency	31.3232	12.9440	99
11 - SAT Verbal	262.7238	48.0452	103
12 - SAT Mathematics	287.5619	46.2851	103
13 - M.A. California MM	163.8333	27.8642	96
14 - Reading Gain	4.8235	9.6374	102
15 - Listening Gain	5.5670	12.1449	97
16 - Mathematics Gain	3.1200	19.4803	100
17 - SAT Verbal	9.3398	46.1097	103
18 - SAT Mathematics	-2.0583	39.8177	103

TABLE II Correlation Between Eighteen Variables with Pretest STEP Reading, Listening, Mathematics and Mental Age.

	STEP Reading	STEP Lis.	STEP Math	M. A.
STEP Reading (Pre)	1.000	.615**	.264**	.569**
STEP Listening (Pre)	.615**	1.000	.162	.508**
STEP Mathematics	.264**	.162	1.000	.295**
Well-Being (Pre)	.338**	.320**	.096	.207
Responsibility (Pre)	.276*	.237*	.136	.154
Socialization (Pre)	.326**	.264**	.366**	.193
Tolerance (Pre)	.317**	.451**	-.028	.352**
Achievement via Conformity	.312**	.329**	.078	.233*
Achievement via Independence	.259**	.279**	.081	.243*
Intellectual Efficiency	.480**	.417**	.145	.220*
SAT-Verbal (Pre)	.503**	.522**	.031	.602**
SAT-Mathematics (Pre)	.454**	.412**	.172	.526**
M. A.	.568**	.508**	.295**	
STEP Reading (Gain)	-.323**	.023	.087	-.557**
STEP Listening (Gain)	.139	-.177	.023	.178
STEP Mathematics (Gain)	.126	.184	-.562**	.128
SAT Verbal (Gain)	.173	.062	.027	.126
SAT Mathematics (Gain)	.114	.147	.195	.242*

**Significant at .01 level
*Significant at .05 level

RESULTS

The obtained correlations were as follows:

STEP Reading and STEP listening: The results indicate a significant positive relationship between the pretest score on STEP Reading and STEP Listening and between STEP Reading and STEP Mathematics. The correlation between reading and listening was (.61).

STEP Reading Pre with CPI-Well-Being, Responsibility, Socialization, Achievement via Conformity, Achievement via Independence and Intellectual Efficiency: Although these are pretest scores only, several significant relationships were found between the STEP Reading and CPI scores (all seven of the relationships were significant at the .01 level.) Also, between STEP Listening the CPI scores (All Seven Correlations were significant; however, the correlation between Listening and one of the CPI subtests-Responsibility was only significant at the .05 level.).

STEP Mathematics Pre with SAT Mathematics Pre: There was no significant relationship found between the STEP Mathematics Pretest Scores and SAT Pretest Scores. However, the correlation between STEP Reading on the pretest and SAT Verbal Pretest was .503 and the correlation between Listening and SAT Verbal was .522. (The inconistency between STEP Mathematics and SAT Mathematics seem to indicate that the SAT Mathematics Test may have required more reading than the STEP Mathematics Test.

STEP Pre with M. A.: When the correlations were examined, it was found that these variables correlated significantly with Reading and Listening. The relationship with Mathematics was lower, but still significant at .01 level.

STEP Reading Pre with STEP Reading Gains: The only two significant correlations here are -.324 between STEP Reading pretest and gain score on the STEP Reading and -.562 between STEP Mathematics pretest gains on the STEP Mathematics. This may show the tendency for students who scored low on the Reading pretest to make greater gains than those who started out initially with a high pretest score. The same is true for Mathematics.

SAT Verbal Pre, SAT Mathematics Pre with M. A.: SAT Verbal Pretest scores correlated with M. A. showed a significant correlation of .60 and SAT Mathematics with M. A. was .52.

SAT Pre with STEP Gains in Reading, Listening and Mathematics:

There were only two significant relationships: (1) SAT Verbal Pretest and STEP Reading gains. There was a positive relationship of .05 level which indicated that those students who had high scores on the SAT Verbal pretest made greater gains on the STEP Reading than those with low pretest scores on the SAT Verbal. (2) SAT Verbal pretest and STEP Mathematics gain. There was a positive relationship at the .01 level of significance which indicated a similar condition.

SAT Mathematics Pre with SAT Mathematics Gains: Again, there was a negative relationship.

M. A. with STEP and SAT Gains: There was only one relationship between M. A. and gains on STEP or SAT. This was a low positive relationship (.243) between M. A. and gains on SAT Mathematics.

Confidence intervals for:

1. STEP Reading Gain (n=102) $2.71 < \text{Mean} < 6.73$ =.95
2. STEP Listening Gain (n=97) $3.10 < \text{Mean} < 7.04$ =.95
3. SAT Verbal Gain (n=103) $0.23 < \text{Mean} < 18.44$ =.95

Confidence intervals for SAT and STEP Mathematics mean gain scores encompassed zero.

Prediction Equations (n=82)

Two predictions equations were obtained for each of the five gain scores. The first equation permits the respective pre-test score to enter as a predictor--the second equation uses only the 12 predictors and includes the repective pre-test score. Arbitrarily, a maximum of five predictors were obtained for each of the equations. Eight of the ten equations yield a significant "F" value when testing the hypothesis that all regression coefficients are zero.

Prediction of Gain Scores. The results of step-wise linear prediction of Gain Scores are presented below:

Table III--A Step-wise Linear Prediction of Reading Gain Scores

Variables	R	R^2	Coefficients
Reading STEP (Pre)	.2979	.0888	-.510
SAT Verbal (Pre)	.5255	.2762	+.078
STEP Listening (Pre)	.5684	.3231	+.242
Intellectual Efficiency	.5900	.3481	+.257
Achievement via Conformance	.6101*	.3723	-.177

Table III--B

SAT Verbal (Pre)	.2258	.0510	+.069
M. A.	.3347	.1120	-.194
Tolerance (CPI)	.3530	.1246	+.160
Well-Being (CPI)	.3713	.1379	-.113
Responsibility (CPI)	.3837*	.1472*	+.109

The five variables that resulted in the best prediction of gain scores in reading are given in Table IIIa. While reading, verbal ability, and listening scores made in the Fall explain about 87 per cent of the variance in gain scores accounted for, the two personality characteristics explain the rest.

The five variables that gave the best prediction of gain scores in mathematics are shown in Table IV.

Table IV--A Step-wise Linear Prediction of STEP Mathematics Gain Scores

Variables	R	R^2	Coefficients
Mathematics (Pre)	.5179	.2682	-.749
SAT-V	.6158	.3792	.076
Reading (Pre)	.6353	.4036	.195
SAT-M (Pre)	.6444	.4152	.051
Achievement via Conformance	.6499	.4224	.142

Table IV--B

SAT Verbal (Pre)	.2788	.0777	+.082
Socialization (CPI)	.3720	.1384	-.573
Tolerance (CPI)	.4115	.1693	+.400
Achievement via Conformity	.4264	.1818	+.261
Achievement via Independence(CPI)	.4376	.1915*	-.240

The first four tests shown in the table IV-A explain about 98 per cent of the variance accounted for by the five variables. So far, as can be seen, the tests used in this study predict gain scores in reading and mathematics as measured, about as well as entrance examination scores and high school records predict freshman grade averages.

The five variables that gave the best prediction of verbal gain scores are shown in Table V-A.

Variables	R	R^2	Coefficients
SAT Verbal (Pre)	.2411	.0581	-.447
Reading STEP (Pre)	.4773	.2278	+1.19
Responsibility (CPI)	.5080	.2580	+.936
Mental Age (M.A.)	.5344	.2856	+.525
Intellectual Efficiency (CPI)	.5513	.3039*	-.506

Table V--B

Reading STEP (Pre)	.2361	.0557	.863
Responsibility (CPI)	.2741	.0751	.703
Intellectual Efficiency (CPI)	.3205	.1027	-.734
Well-being (CPI)	.3352	.1124	.355
STEP Listening (Pre)	.3424	.1172	.334

The results of the prediction of verbal gain scores show that 30% of the variability in SAT verbal gain is attributable to variables shown above in Table V--A.

Table VI Step-wise Prediction of SAT Mathematics Gain Scores

Table VI--A

Intellectual Efficiency	.2833	.0802	+.594
SAT Mathematics (Pre)	.3554	.1263	-.407
M. A.	.4993	.2493	+.576
STEP Mathematics (Pre)	.5321	.2832	+.585
SAT Verbal	.5701	.3250	+.206

Table VI--B

Intellectual Efficiency	.2833	.0802	+.518
STEP Mathematics (Pre)	.3549	.1260	+.743
SAT Verbal	.3925	.1540	+.112
Socialization (CPI)	.4107	.1687	-1.066
Well-Being (CPI)	.4512	.2036	-.735

The results of the prediction of SAT mathematics gain scores show that 32% of the variability in SAT mathematics gain scores is attributable to variables in Table VI--A.

The prediction of gain scores in listening proved to be far less efficient. The results are shown in Table VII.

Table VIII Step-wise Linear Prediction of Listening Gain Scores

Table VII--A

STEP Listening (Pre)	.1579	.0249	-.310
Mental Age	.2620	.0686	+.154
Socialization (CPI)	.2921	.0854	-.388
Well-being (CPI)	.3375	.1139	+.221
STEP Mathematics (Pre)	.3674*	.1350*	+.130

Variables Entered	R	RSQ	Coefficients
Listening			
Socialization (CPI)	.1532	.0235	-.454
STEP Mathematics (Pre)	.2160	.0467	+.164
Well-being (CPI)	.2806	.0788	+.198
Achievement via Conformity (CPI)	.2912	.0848	+.126
Achievement via Independence	.3057	.0934*	-.137

Examination of Table VII-A shows that less than 15 per cent of the differences in gain scores in listening could be explained by the five variables that gave the best prediction of these scores.

DISCUSSION

The purpose of this study was to determine if there was a variable or collection of variables crucial to predicting the success of College Education Achievement Project students at Albany State College. The finding show that there was a fairly high correlation between reading and listening which indicated that listening is a possible index to use in pretesting possible College Education Achievement enrollees.

When the seven non-intellectual personality characteristics of the California Psychological Inventory were correlated with STEP Reading and Listening, all seven showed significant relationship to reading and listening at the .01 level of confidence except one, CPI-Responsibility, which correlated with Listening at the .05 level. The significance of these findings seem to rest on their being consistent with some explanation concepts by McKelpin. "If the intrapersonal and interpersonal behavior of students can be developed to optimal levels of development, then their academic efforts will be more productive. If the social and psychological functioning of students can be enhanced, then their levels of scholastic productivity will be raised."

The third finding which shows a fairly high correlation between STEP Reading and pretest scores on SAT Verbal indicated that the best possible predictor of the variables computed was SAT Verbal pretest scores. Another factor of importance was found in the negative correlations of STEP Reading pretest scores with STEP Reading gains. Although this seemed unusual, it is significant to the study because those students who scored low on the Reading pretest made greater gains than those who scored high initially.

However, when SAT pretest scores were correlated with STEP Reading gains, there was a tendency for those who had scored high on the SAT Verbal pretest to make larger gains on the STEP Reading than those scoring low on pretest of SAT Verbal.

Another inconsistency was in the results of SAT pre with SAT Gains. A significant negative correlation existed between the first two tests while a positive relationship was found between SAT Verbal pre and SAT Mathematics gains. The correlations of SAT Mathematics Pre with SAT Mathematics gain showed another negative significant relationship.

Five of the variables which proved in simple regression to be significantly related to the criterion remained significantly related in combination. With regard to predicting the success of College Education Achievement Project students, the five best possible predictors are:

1. Over-all, for the five gain scores investigated, SAT Verbal pretest is a "good" predictor.

2. Because of the intellectual loading found in the subtests of the California Psychological Inventory and the significant correlations with Reading and Listening, this non-intellectual measure maybe another possible predictor.

3. The significant gains on STEP Reading 2.71 < Post-Pre 6.73 ≈ .95 can be used as a measure of expected growth.

4. The significant gain on STEP Listening 3.10 < Post = Pre < 7.04 ≈ .95 indicates listening ability is amendable to positive change.

5. The significant gain on SAT Verbal 0.23 < Post- Pre < 18.44 ≈ .95 indicates that the Verbal intelligence of disadvantaged college youth can be improved.

Summary and Conclusions

A study of achievement, ability, and personality characteristics as related to gain scores in reading, mathematics, and listening indicated that while gains in reading and mathematics were predictable with a level of efficiency similar to that for predicting freshman grade averages, the prediction for listening was not as efficient. The gain scores were found to be negatively related to the pretest scores in their respective areas. What this seems to indicate is that when using pre and gain scores, students who score lowest at the beginning of the program might be expected to profit most from instruction.

In terms of the purpose of this study, it was concluded that the two sets of variables employed to predict gain scores in reading and in mathematics for CEAP enrollees at Albany State College resulted in moderate success.

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